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Socio-Economic Factors Affecting Beef Production In West Virginia

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ABSTRACT

Beef cattle production continues to grow in West Virginia while economic studies have indicated that the enterprise is less profitable than other alternatives. This study examines both economic and noneconomic forces contributing to that contradiction. The primary contributing economic factor is land resource; when full utilization of all the hilly pastureland is required beef cattle enter into the optimal linear programming solutions. Farmer attitudes and opinions indicate that both types of forces are influential. They cite land adaptability, labor requirements, and lower risk as affecting the selection of beef cow herds as their major farm enterprise—although the LP studies indicate that excess labor exists on most farms. Perhaps more important factors are the preferences of the farmers; most prefer to handle beef cattle and would continue to do so although other enterprises might be more profitable.

Key Words: Beef cattle, economics, attitudes, opinions, risk aversion, pasture utilization, West Virginia.

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Socio-Economic Factors Affecting Beef Production in West Virginia

Stephen K. Hedrick and Dale K. Colyer

Livestock numbers, along with numbers of farms and land in farms, have been declining in West Virginia for the last two decades. The exception to these trends has been beef cattle numbers which have tended to increase slightly (Figure 1). Some recent economic studies, however, have indicated that beef cattle, especially cow-calf operations, have a much lower economic potential than other livestock enterprises.[1] With the resources, prices, costs, and production coefficients used, dairy production resulted in the largest net incomes followed by market hogs, sheep, and beef cattle.[2]

This study was undertaken to examine why the actual trends seem to be toward beef cattle, a less profitable alternative. Various sizes of farms and resource combinations derived from a study of beef cattle farms in the eastern area of the State (Figure 2) were used for the study,[3] with consistent results with respect to profitability of the alternatives. The results also were tested at different prices for the livestock and livestock products and found to be relatively stable over substantial price ranges. The results, if accepted, tend to indicate that West Virginia farmers have not adjusted their operations for maximum profitability and raises the question of why not. Also, can such changes be expected to occur? The answers have important implications for the agricultural sector of the State.

OBJECTIVES AND PROCEDURES

The overall objective was to determine reasons that farmers in West Virginia continue to increase beef cow numbers. The specific objectives were to (1) examine the economic consequences of variations in the land, labor, and capital resources or coefficients of the economic models previously used to evaluate

[1]See: Alfred L. Barr, George E. Toben, and Charles C. Wilson, Jr., *Resources, Production, and Income on Eastern West Virginia Beef Cattle Farms,* W.Va. Agr. Exp. Sta. Bull. 546 (1967), and Ronald A. Layton, Paul E. Nesselroad, and Alfred L. Barr, *Alternative Farm Plans for Eastern West Virginia Livestock Farms,* W.Va. Agr. Exp. Sta. Bull. 597T (February 1971).

[2]Layton, *et al., op. cit.*

[3]Barr, *et al., op. cit.*

Figure 1. Livestock Numbers in West Virginia 1950-72.

[a]All cattle minus milk cows 2 years old and over.

Source:

West Virginia Department of Agriculture, West Virginia Crop Reporting Service, *West Virginia Agricultural Statistics:* 1956, pp.11,12,14, 1962. C.R. Bulletin No. 4, pp.22,25,28. 1968. C.R. Bulletin No. 7, pp.19,21,22 (Charleston: West Virginia Department of Agriculture, January 1957, January 1963, February 1968, November 1969).

United States Department of Agriculture, Statistical Reporting Service, Crop Reporting Board, *1971 Livestock and Poultry Inventory,* Washington, D.C. United States Department of Agriculture, February 5, 1971 pp.8,13,16,29.

United States Department of Agriculture, Statistical Reporting Service, Crop Reporting Board, *Cattle, Sheep and Goat Inventory,* Washington, D.C. United States Department of Agriculture, February 4, 1972 pp.71,72.

United States Department of Agriculture, Statistical Reporting Service, Crop Reporting Board, *Hogs and Pigs,* Washington, D.C. United States Department of Agriculture, December 22, 1971 p.7.

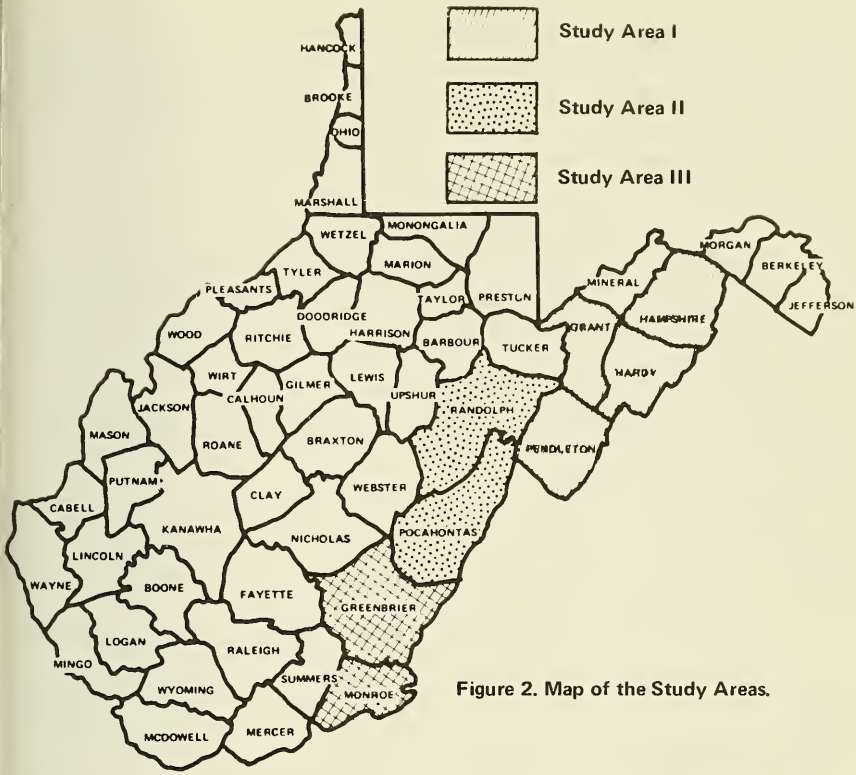

Figure 2. Map of the Study Areas.

alternative livestock enterprises on eastern West Virginia farms; (2) determine the reasons that farmers handle beef cattle and their attitudes and opinions about beef cattle and other livestock; and (3) examine the relationships of beef cattle farmers' attitudes toward risk, economic motivation, scientific orientation, and independence and compare them with dairy farmers.

The linear programming model used in a previous study was modified to further examine some of the economic factors affecting livestock production. Variations were made in labor resources availability and requirements, in capital availability and the ways in which capital was handled in the model, and in the pastureland utilization. In one modification, utilization of all pastureland was required.

Farmers who had been interviewed for an earlier study to determine the resources available on beef cattle farms in eight counties in the eastern part of the State were re-interviewed to obtain data on their operations, characteristics, opinions, and attitudes. Two questionnaires were used: one to obtain information about the operations, characteristics, and opinions of the beef producers; and the second to determine their attitudes with respect to risk aversion,

economic motivation, scientific orientation, and independence. This second questionnaire also was sent to a group of large dairy farmers to compare their attitudes with the beef producers, who also had fairly large operations. There were 47 beef cattle producers interviewed and 17 dairy farmers returned the second questionnaire.

LINEAR PROGRAMMING ANALYSIS

The studies which were cited and which indicated that beef cow herds were less profitable than the alternative livestock enterprises used linear programming models in which several specific assumptions were made with regard to resource levels, efficiency, and related factors. This section reports on additional economic analyses made using the same basic linear programming model but with some of the assumptions changed to reflect other situations. Details of the model are reported elsewhere and, therefore, only the modifications and their effects will be discussed here.[4]

Changes in labor resources and labor coefficients for beef cow herds were made to determine if restricted labor might be an important cause of beef production in the State. As a first step in this analysis, hired labor was excluded for all four labor periods—winter, spring, summer, and fall.[5]

The labor resource in each period was reduced by half so that the farm operator and his family would have a work week more similar to the work week of persons in industry. The original labor resource values allowed a 62.5 hour work week for the farm operator with an additional 765 hours of work per year available from other members of the farm family.

The farm plans computed originally had dairy as the only livestock enterprise, while corn for grain was the chief crop enterprise. However, the number of dairy cows was reduced from 55 to 14 head when labor was restricted. At the same time market hog production increased from 0 to 640 head per year. All cropland except 50 acres of Class I land was unused. Required investment capital decreased from $31,600 to $7,920 while the operating capital required increased from $18,860 to $21,950. The original solution had an excess of labor during all time periods while in this solution spring labor was limited.[6] Renting out of pasture increased from 50 to 84 animal units. Because 14 cows

[4]See Layton, *et al., op. cit.*

[5]"Small" farm models for each of two sub areas were used for the variation tested. Although called "small" these farms had resource levels well above those of the average beef farm for the State.

[6]The spring labor had a computed shadow price of $25.44 per hour, indicating the importance of this resource when it is restricted in an important production period. The shadow price tells how much profits could be increased by the addition of one more unit of a limited resource. Some labor was in excess, unused, in each of the other time periods.

are not considered an economically viable unit for dairy production, that enterprise was not permitted for another alternative, which resulted in increased production levels for the hogs. This required large purchases of corn to feed out the hogs. In other variations of this basic model corn purchases were limited, renting out of pasture not permitted, and the labor requirements for beef cattle reduced by half. Reducing labor requirements for beef had no effect on the enterprises included in the computed optimal farm plans nor did the elimination of the alternative of renting out land. In this latter case the excess pastureland was allowed to remain idle. Limiting corn purchases resulted, however, in the substitution of sheep for some of the hogs. All of these changes were consistent with the result of the previous study.

Changes were also made with respect to the capital limits and the ways in which the capital borrowing and repayment activities were treated in the linear programming model. When capital was limited to $12,000, sheep and hogs were the main enterprises—a result that tends to indicate that the sheep enterprise becomes more favorable when capital is limited. The other modification was to require repayment of loan funds out of the annual cash flows, one-fifth per year for investment loans all of the funds borrowed for operating purposes. Dairy was not blocked from this latter alternative and was in the computed optimal plan with 31 cows while a 132 ewe flock also was part of the plan.

For the final model variation pasture disposal (renting out or nonuse) was blocked, i.e., all pasture had to be utilized by livestock. In all the previously discussed solutions, some pasture was either rented out or allowed to remain idle. The computed optimal plan for this variation was closer to what is actually practiced on beef farms in West Virginia. This plan included a total of 87 brood cows and their replacements. Summer grazing of 95 steers from May 1 to October 1 also was included and, in addition, there was a 22 ewe flock.

From this analysis it appears that if full utilization of the available resources along with low amounts of outside purchases is an objective or practice of farm operators in West Virginia, a beef cow herd can be an important enterprise. Returns can be increased by use of other enterprises but only if large amounts of inputs are purchased—a situation that would require substantial borrowing. When capital borrowing is severely restricted, net returns from plans with other enterprises are not so disproportionately greater than received from the solution with a beef herd included. Other factors, economic and noneconomic, may also significantly affect the relative importance of beef cows compared to other enterprises.

CHARACTERISTICS AND OPINIONS OF BEEF PRODUCERS

This section concerns the responses of farmers to a questionnaire designed to determine the reasons that they handle beef instead of some other type of

livestock. A sample of 47 of the farmers previously contacted was randomly chosen and re-interviewed.[7] The interviews were conducted in the spring and summer of 1971.[8]

The schedule also was used to obtain information on the present numbers of livestock on the farms, the number of beef cattle on the farm when the farmer started handling beef cattle, the number on the farm in 1970, the average for the last five years, and other characteristics of the farmers' operations.

Farmers were asked why they had increased or decreased their herd size, their major reasons for handling beef cattle, the advantages and disadvantages of beef cattle, and the feeding and marketing practices being followed. A number of questions were used to rank livestock enterprises according to risk involved, technical knowledge required, income received, and similar classifications. A ranking of importance also was obtained for sources of information, help, and advice for dealing with beef cattle practices.

General Characteristics

The 47 farmers interviewed averaged 54.7 years of age and had attained an average education level of 12.1 years. They operated an average of 964 acres and hired the equivalent of 13.2 months of labor in addition to that of the operator and family members. On the average, farmers in the study group started handling beef cattle in 1947 and received 68.7 per cent of their total sales income from beef cattle. Of those interviewed, 87.2 per cent of their fathers also had raised cattle. At the time of the interviews, livestock numbers per farm averaged 1.8 milk cows, 89.3 beef cows, 48.9 feeder calves, 28.7 fat cattle, 57 hogs, and 74.6 sheep.

Number of Cattle

Of the 47 farmers interviewed, 34 were handling more beef cattle in 1970 than they handled the first year that they owned beef cattle, six were handling fewer beef cattle, and seven were handling the same number. Thirty-six of the 47 farmers stated that they planned to operate the same size beef cattle operation next year. Four planned an increase and one said he was going to become more diversified next year. Two farmers each said their plans for next year were to retire from farming, reduce the present beef enterprise, or change the major farm enterprise.

Plans for five years from now for 19 farmers were to continue the present beef enterprise. Nine farmers plan to expand their beef cattle herds in the next

[7]Barr, *et al., op. cit.*

[8]The schedule used was based on one developed by Araji: See A. A. Araji, *Economic and Social Factors Affecting the Location of the Cattle Feeding Industry,* Unpublished Ph.D. Thesis, University of Missouri, 1969.

five years, seven to completely retire from farming, five to change the major farm enterprise, and four to reduce the present size of the beef cattle enterprise. One farmer intends to make his farm business more diversified in the next five years, while two were not sure of their plans for five years from now.

Feeding and Marketing Practices

Forty-four of the farmers interviewed produced all the hay used on their farms while two farmers produced 75 to 99 per cent and one farmer produced 50 to 74 per cent of the hay used. About half the farmers (24) produced a surplus of hay, but for most of these (18) the surplus was small (one to 25 per cent of their annual production). Forty farmers fed silage as well as hay. Of these, 34 fed corn silage and six fed both corn and grass silage. During the winter, 12 farmers fed their cattle in the barn during the entire winter, 16 fed their cattle in the open, and 19 farmers fed their cattle in the barn part of the time and in the open part of the time.

Special feeder calf sales were used by 19 farmers to market their calves. Six producers sold their calves to other farmers, two farmers used livestock auctions, while one farmer used a combination of livestock auctions and special feeder calf sales. Fifteen of the 47 farmers fed out all their calves and four of the farmers interviewed did not produce feeder calves. Fifteen farmers sold 75 to 100 per cent of the feeder calves they produced, seven sold 50-75 per cent, four sold 25-50 per cent, and two farmers sold 1-25 per cent.

Costs and Income

From the 47 farmers interviewed, 37 did not think beef cattle farmers had more costs than other types of farmers and seven thought they did. Three farmers did not comment concerning the costs involved in beef cattle farming. Banks and personal funds were the principal sources of financing for 18 and 16 farmers, respectively. The principal source of finances for five farmers was Production Credit Associations and four other farmers used a combination of banks and Production Credit Associations as their main sources of funds. Four farmers obtained finances from sources other than those listed above.

Thirty-two of the farmers believed their incomes were similar to other beef cattle farmers' incomes while only 22 of the 47 believed that their incomes were similar to those of farmers without beef cattle. On the other hand, 10 farmers said their incomes were above those of other cattle farmers while 14 farmers said their incomes were above the incomes of farmers without beef cattle. Five farmers thought that their incomes were below those of other cattle farmers while nine of the farmers thought their incomes were below the incomes of farmers who did not handle beef cattle. Two beef cattle farmers did not compare their incomes to farmers who did not handle cattle.

When asked if they would continue to handle beef cattle if the same income could be derived from another enterprise, 37 of the farmers said yes and 10 said no. Of the 37 farmers who planned to continue to handle beef cattle if they could have the same income from another enterprise, 17 said that they enjoyed beef cattle more than any other enterprise and therefore would not change enterprises. Seven farmers gave "less labor required" as a reason for not changing from beef to another enterprise if the same income could be derived. Another seven indicated "my land is adapted" to beef as their reason for not changing enterprises. The following reasons for not changing his major farm enterprise was each given by one farmer— "have more knowledge about beef cattle practices," "enjoy beef cattle and my land is adapted," and "enjoy beef cattle and have more knowledge about beef cattle practices."

Each farmer was asked to rank the total sales from his farm in 1970 in one of the following ranges: no sales, $1-$4,999; $5,000-$9,999; $10,000-$14,999; $15,000-$24,999; $25,000-$34,999; $35,000-$44,999; $45,000-$54,999; and $55,000 and over. Nine farmers estimated the value of total sales from their farm in 1970 to be between $5,000 and $9,999. The largest group, 12 farmers, estimated their total sales between $10,000 and $14,999, while 11 farmers, the second largest group, estimated their total sales as between $15,000 and $24,999. Five farmers said their total farm sales would fall in the $25,000 to $34,999 range; two farmers were in the $35,000 to $44,999 range; three farmers were in the $45,000 to $54,999 range; and five farmers were in the $55,000 and over range. Thus, it appears that the average sales per farm are around $25,000.

Each farmer was asked how he would prefer to receive his income and 34 of the 47 farmers said they would prefer to receive part of their income every month, six farmers preferred several times during the year, two preferred one time per year, and one twice per year. No preference was stated by four of the 47 farmers. Most of the farmers prefer to receive part of their income every month to make budgeting and planning of farm and family activities less complicated.

Attitudes About Beef Cattle

Several questions were designed to determine the attitudes and the reasons for farmers having beef production enterprises on their farms. The approach used was to prepare a list of probable responses and then to ask the respondent to select those he considered to be the first, second, and third most important reasons. If a respondent had, as one of his choices, a reason other than those listed, he was asked to state it. The response lists for each question are shown in Table 1 where the results are given.

In addition to using the number of farmers responding to each reason listed, a weighted score was developed for each response where the first choice was

TABLE 1

FARMER RESPONSES TO QUESTIONS CONCERNING ATTITUDES TOWARD BEEF CATTLE

Questions and Possible Answers	Farmer Responses			
	First Choice	Second Choice	Third Choice	Weighted Value
Reasons individual farmer handles cattle:				
(a) Father was cattle man	5	1	7	24
(b) More return on investment compared to other types of farming	1	-	3	6
(c) Part of the land adaptable for pasture only	23	10	3	92
(d) Enjoy handling beef cattle more than other types of farming	13	20	7	86
(e) Beef cattle neighborhood	2	8	12	34
(f) More net income compared to other types of farming	-	1	2	4
(g) Other[a]	3	7	9	-

(continued on next page)

Table 1 (continued)

Questions and Possible Answers	Farmer Responses			
	First Choice	Second Choice	Third Choice	Weighted Value
Advantages of handling beef cattle:				
(a) More return on investment compared to other types of farming	1	2	3	10
(b) Less risk	3	1	3	14
(c) More adaptable to my type of farming	26	5	4	92
(d) More adaptable to my area	4	13	8	46
(e) High turnover on limited amount of land	-	2	1	5
(f) Utilization of feed produced on my farm	5	14	6	49
(g) Cattle are easy to handle	3	6	15	36
(h) More people around here handle cattle	-	2	3	7
(i) Easy to obtain financing	-	1	-	2
(j) Other[b]	6	2	4	-

Disadvantages of handling beef cattle:					
(a)	Too risky	5	6	2	29
(b)	Less returns on investment compared to other types of farming	19	7	3	74
(c)	Not adaptable to my area	-	1	-	2
(d)	Greater income fluctuation compared to other types of farming	4	10	11	43
(e)	No steady income	11	11	8	63
(f)	Cattle farmers are looked down on	-	-	1	1
(g)	Cattle are hard to handle	1	-	4	7
(h)	Very few cattle farmers around here	-	1	2	4
(i)	Other[c]	2	3	2	-

[a]Other reasons in this case included: require less labor, available market, and do not require large amounts of equipment.

[b]Other reasons in this case included: require less labor, not as confining to farm, enjoy cattle, require smaller investment, and less disease risk.

[c]Other reasons in this case included: require better fences, poor market for heavy cattle, and large amount of land required.

given a weight of three, the second of two, and the third of one. Thus, the overall importance of each particular response *vis-a-vis* the others could be estimated. This procedure assumes that the response listed first is believed more strongly than the second or third, and that the second is held more strongly than the third.

Among the questions for which this approach was used were those directed toward determining reasons that beef cattle are handled. The results for these questions are given in Table 1.

Reasons for Raising Beef Cattle

All of the farmers were asked to indicate the three most important reasons that they have beef cattle on their farms. The most important reason given was that part of their land was adaptable only to pasture and, by inference, to cattle. Twenty-three farmers gave this as the most important reason, ten as the second most, and three as the third most, which means that 36 out of 47 respondents believed they had land which was best used as pasture for beef cows. The weighted sum for this response was 92, the largest of all the reasons listed.

However, even more respondents indicated that they handled beef cattle because they enjoyed doing so—40 out of 47. There were 13 who gave this as their first choice while 20 gave it as the second and seven as the third choice. The weighted sum for this response was 86, very close to the 92 obtained for the pasture land adaptability response. Furthermore, two other noneconomic responses were next in importance; several farmers were influenced by their fathers who had raised cattle and several said they utilized cattle because their area was a "beef cattle neighborhood."

Advantages of Handling Beef Cattle

Each farmer was asked to indicate what he considered the three major advantages of beef cattle. "Beef cattle are more adaptable to my type of farm" was the most common response, the first choice of 26 farmers, the second choice of five farmers, and the third choice of four farmers. This response had a weighted value of 92, compared to 49 for the second most popular choice, "utilization of the feed produced on my farm," which was the first choice of only five farmers, the second choice of 14 farmers, and the third choice of six farmers. "Beef cattle are more adaptable to my area" closely followed with a weighted value of 46 and was the first choice of four farmers, the second choice of 13 farmers, and the third choice of eight farmers. A not too distant fourth choice, "cattle are easy to handle," had a weighted value of 36 and received the responses of three, six and 15 farmers as their first, second, and third choices, respectively. Six and ten farmers, respectively said that "cattle gave higher returns" and "were less risky than other enterprises."

Again, land adaptability appears to be the major factor causing farmers to favor beef cattle production, with the first three most frequently given responses being related. The fourth most popular response, "cattle are easy to handle," may be an indication as to why so many part-time farmers in West Virginia handle beef cattle instead of some other more profitable livestock enterprise that requires more time and attention.

Disadvantages of Handling Beef Cattle

The major disadvantage of beef cattle, according to a majority of the respondents, is low returns in relation to investment. This response had a weighted value of 74 and was the first response of 19 farmers, the second of seven farmers, and the third of three farmers. Therefore, it appears that farmers are aware that returns are relatively low for a beef cattle enterprise and, thus, purely economic reasons are not the factors that most encourage beef production in the State.

The other commonly cited disadvantages also were economically related reasons. "No steady income" had a weighted score of 63 and was the first response of 11 farmers, the second of 11 farmers, and the third of eight farmers. "Greater income fluctuation compared to other types of farming" was the third most frequently stated disadvantage. The fourth, with a weighted value of 29, was that "beef cattle are too risky."

Factors Affecting Numbers of Beef Cattle on Farms

Questions included in this section were used to determine if, and why, individual farmers had changed the size of their beef cattle enterprise since they had initially gone into business. Each farmer was asked if he was handling more, less, or the same number of beef cattle than during his first year. Thirty-four farmers had more, six less, and seven the same number. Each farmer was then asked to choose from a list of reasons and rank the three major reasons for these changes. The responses to the ranking questions are given in Table 2. A weighted value also was determined for each question in this section in the manner described in the section on attitudes toward beef cattle.

In addition, each farmer was asked if he believed he was presently handling as many beef cattle as his farm was capable of carrying. Thirty-one of the 47 farmers said they were not carrying the farm's capacity for beef cattle. This group was then asked to rank the three major reasons why. The responses to this question are shown in Table 3.

Reasons for Handling More Cattle

Cattle numbers had been increased on 34 farms. The more important reasons for these increases were related in one form or another to carrying

TABLE 2

FARMER RESPONSES TO QUESTIONS ABOUT CHANGES IN BEEF CATTLE NUMBERS

Questions and Possible Answers	Farmer Responses			
	First Choice	Second Choice	Third Choice	Weighted Value
Reasons farmer handles more cattle than first year had cattle:				
(a) Lower labor cost per head	1	2	3	10
(b) Lower machinery and equipment costs per head	2	1	5	13
(c) Lower feed cost per head	-	1	2	4
(d) Availability of adequate facilities	1	2	4	11
(e) Availability of labor	1	1	-	5
(f) Increase in selling price per head	-	2	1	5
(g) Surplus feed supply on my farm	8	4	2	34
(h) Surplus feed supply in the area	-	-	1	1
(i) Availability of adequate pasture land	2	8	3	25
(j) Availability of marketing facilities	-	1	1	3
(k) Availability of marketing and feeding information	-	1	-	2
(l) Obtained more land	9	-	-	27
(m) Cleared land	3	-	1	10

(o)	Other[a]	4	4	10	-
Reasons farmer handles fewer cattle than first year had cattle:					
(a)	Higher machinery and equipment cost per head	1	-	-	3
(b)	Difficulties of obtaining labor	1	2	1	8
(c)	Shortage of feed supply	-	1	-	2
(d)	Other[b]	4	3	3	-
Reasons farmer handles same number of cattle as first year had cattle:					
(a)	Higher labor costs per head	1	-	-	3
(b)	Higher machinery and equipment cost per head	-	2	1	5
(c)	Lack of adequate facilities to expand	1	-	2	5
(d)	Difficulties of obtaining labor to expand	2	2	1	11
(e)	Increase in buying price per head	-	-	1	1
(f)	Shortage of feed supply	2	-	-	6
(g)	Not enough pasture land to expand	-	1	-	2
(h)	Lack of veterinarian support	-	1	1	3
(i)	Other[c]	1	1	1	-

[a]Other reasons in this case included: use of machinery, capital available, father retired, maintain standard of living, decrease in labor required per head, and decreased dairy and sheep numbers.

[b]Other reasons in this case included: bad health, increased sheep numbers, have not replaced culled cows yet, return on investment not as large as other investments, and operating different farm.

[c]Other reasons in this case included: do not want to increase debt load.

TABLE 3

REASONS GIVEN FOR NOT HANDLING FARM POTENTIAL FOR BEEF CATTLE

Possible Answers	Farmer Responses			
	First Choice	Second Choice	Third Choice	Weighted Value
(a) Difficulties of obtaining loans	2	-	-	6
(b) Marketing difficulties	-	-	1	1
(c) Labor shortage	13	6	1	52
(d) Increasing risk	1	3	3	12
(e) Decreasing net returns per head	1	1	4	21
(f) Do not want to work any harder	1	8	2	21
(g) Like to remain diversified	-	-	2	2
(h) Beginning to think about retirement	-	2	4	8
(i) Other[a]	13	11	13	-

[a]Other reasons in this case included: early drought, cattle not available to restock, shortage of winter food, pasture shortage, do not want to increase debt load, market price too low, large capital investment required, bad health, increased length of grazing season, off farm work, disease danger, and shortage of barn space.

capacity of the farm. Fourteen farmers stated that they "had a surplus feed supply," 13 "had pastureland available," 10 had "increased the fertility of their land," nine had "obtained more land," and four had "cleared land." These had weighted scores of 34, 25, 23, 27, and 10, respectively. Reasons not directly related to carrying capacity of the farm which had weighted scores around 10 included "lower labor costs" and "lower machinery costs than other livestock enterprises." Other responses included "availability of facilities," the "need to increase cattle numbers to maintain the standard of living," "reduced dairy and sheep numbers," and "use of modern machinery."

Thus, from the responses given for this question it appears that the farmers initially did not have their farms stocked to their potential or they increased the farm's potential by increasing soil fertility levels, clearing land, or obtaining more land.

Reasons for Handling Fewer Cattle

Only six of the 47 farmers interviewed were handling fewer cattle than the first year they were in the beef cattle business. With such a small sample it is doubtful that the results obtained are representative of the State's farmers who are now handling fewer cattle than when they began a beef cattle business.

Four of the six farmers said the "difficulty in obtaining labor" was one of their major reasons for handling fewer cattle. Other reasons cited by these farmers included "higher machinery and equipment cost per head," "a feed supply shortage," "now operating a different farm," the return is "not as great a risk compared to other investments," "increased sheep numbers," and that he had "culled cows without replacement." However, none of these other reasons were cited by more than one farmer.

Reasons for Handling Same Number of Cattle

Seven of the 47 farmers interviewed stated that they are now handling the same number of beef cattle as they handled the first year they were in the beef cattle business. Again it is difficult to draw definite conclusions from such a small sample. However, it again appears that "difficulties of obtaining labor" is the major reason that farmers do not expand their beef cattle herds. This was cited by five of the seven farmers as one of the reasons for not expanding. Other reasons cited included "a shortage of feed," "higher machinery and equipment cost per head," and "lack of adequate facilities to expand."

Farm Potential for Beef Cattle

Only 16 of the 47 farmers said they were handling as many cattle as their farms are capable of supporting and the remainder said they could support more. These 31 were asked to indicate, in descending order, the three most important reasons for not handling cattle up to their farms' potentials (Table 3). The most

frequently listed reason was "a shortage of labor"; 13 farmers gave that as the most important factor while six gave it as the second reason and one as the third reason. The weighted value for this variable was 52, greater than for any other single reason. In addition, several farmers gave labor related answers such as "not wanting to work harder," "preparing for retirement," "work off the farm," and "poor health." Other reasons cited included "increasing risk," "difficulties in obtaining loans," "decreasing returns per head," "a shortage of winter feed," "market price too low," "large capital investment requirements," "bad health," and "working away from home."

Comparison of Beef With Other Enterprises

Several questions asked for a ranking of farm enterprises with respect to skill required, risk involved, and degree of success. Weighted scores for the responses were determined by assigning a value of three to a first choice, two to a second choice, and one to a third choice and totaling the assigned values. Additional questions about farm enterprises were used to determine which enterprises the respondents believed best provide a steady income and which return the most income per dollar invested.

Skill Required

Each of the farmers was asked which three farm enterprises he felt required the most skill and technical knowledge and to rank them. The responses to this question and the two following questions may be found in Table 4. Dairy farming was the overwhelming choice, the first choice of 18, the second of 11, and the third of six farmers. Dairy farming had a weighted score of 82 compared to the (beef) cow-calf operation, the second most frequent choice, which had a weighted score of only 46.

The cow-calf operation was the first response of seven farmers, the second response of ten farmers, and the third response of five farmers. The weighted values for the remaining enterprises were very close with sheep having a weighted value of 36, finishing fat cattle 35, poultry 32, hogs 18, and grain farming 18. The large amount of skill and technical knowledge required in dairy farming may discourage farmers who have never lived or worked on a dairy farm from starting the enterprise.

Risk

Each farmer interviewed was asked to rank the three farm enterprises that he believed involved the greatest amount of risk. Finishing fat cattle was believed by the respondents to involve much more risk than other enterprises. It had a weighted score of 82, was the first choice of 23 farmers, the second choice of four farmers, and the third choice of five farmers. The second most common response, poultry, had a weighted value of 58, was the first choice of 11 farmers,

the second choice of ten farmers, and the third choice of five farmers. The choices after poultry were hogs with a weighted score of 40, grain farming with 31, dairy farming with 27, cow-calf operation with 18, and sheep with 14. Thus, the cow-calf operation, which the farmers believed to involve the second least amount of risk, may appear favorable due to the low risk factor compared to many other farm enterprises.

Farmer Success

Each respondent was asked to rank the three types of farmers that seemed most successful in their respective communities. The first choice, cow-calf farmers, was the overwhelming favorite, receiving a weighted value of 88 as compared to the second choice, dairy farmers, which had a weighted score of 58. Cow-calf operations was the first choice of 14 farmers, the second choice of 20 farmers, and the third choice of six farmers, while dairy was the first choice of two farmers. Poultry and sheep also were selected by several farmers but other types were only infrequently mentioned. However, in many communities cow-calf operations was the only important type of enterprise and thus many respondents had relatively little basis for comparison.

Steady Income

The farmers thought that dairying provides the steadiest farm income. This was the response of 32 of the 47 farmers interviewed, while the second choice, cow-calf operations, received only seven responses and hogs only two.

Income Per Dollar Invested

Sheep was the farm enterprise that a majority of the respondents believed returned the most income per dollar invested (Table 5). This was the response of 26 farmers, while dairy was selected by 11 farmers. All other enterprises received a very small number of responses with cow-calf operation receiving four and finishing fat cattle, hogs, and poultry each receiving only two responses.

Information About Beef Cattle

Each of the 47 farmers interviewed was asked to identify the sources of information he believed were most, second most, and third most helpful in his beef cattle operation. A weighted score was determined for this question as well as for one which asked for a ranking of persons contacted if a problem developed in the beef cattle herd. Also included in this section was a question concerning the last person with whom the farmer discussed beef cattle practices.

Source of Information

Each respondent ranked the three sources of information that he believed were most helpful to him in his beef cattle operation. Table 6 lists the rankings

TABLE 4

COMPARISON OF FARM ENTERPRISES

Questions and Possible Answers	Farmer Responses			
	First Choice	Second Choice	Third Choice	Weighted Value
Farm enterprise that requires most skill and technical knowledge:				
(a) Cow-calf operation	7	10	5	46
(b) Finishing fat cattle	7	4	6	35
(c) Dairy farming	18	11	6	82
(d) Grain farming	-	5	8	18
(e) Hogs	2	4	4	18
(f) Poultry	6	4	6	32
(g) Sheep	5	6	9	36
Farm enterprise that involves greatest amount of risk:				
(a) Cow-calf operation	3	2	5	18
(b) Finishing fat cattle	23	4	5	82
(c) Dairy farming	3	7	4	27
(d) Grain farming	3	8	9	34
(e) Hogs	2	11	12	40
(f) Poultry	11	10	5	58
(g) Sheep	1	4	3	14

Type farmer that seems most successful in community:					
(a)	Cow-calf	14	20	6	88
(b)	Finishing fat cattle	1	-	8	11
(c)	Dairy	14	7	2	58
(d)	Grain	-	1	1	3
(e)	Hogs	-	2	4	8
(f)	Poultry	8	6	4	40
(g)	Sheep	3	5	12	31
(h)	Other[a]	3	2	2	-

[a]Other reasons in this case included: Orchard, general livestock, and cow-calf and sheep.

TABLE 5

RESPONSES COMPARING VARIOUS FARM ENTERPRISES

Questions and Possible Answers	Number of Farmers Who Responded
Farm enterprise that best provides a steady income:	
(a) Cow-calf operation	7
(b) Dairy farming	32
(c) Hogs	2
(d) Poultry	3
(e) Sheep	3
Enterprise that provides most income per dollar invested:	
(a) Cow-calf operation	4
(b) Finishing fat cattle	2
(c) Dairy farming	11
(d) Hogs	2
(e) Poultry	2
(f) Sheep	26

TABLE 6

RESPONSES CONCERNING INFORMATION ON BEEF CATTLE

Questions and Possible Answers	Farmer Responses			
	First Choice	Second Choice	Third Choice	Weighted Value
Source of information most helpful in beef cattle operation:				
(a) Neighbors, friends	5	4	10	33
(b) Relatives	1	3	2	11
(c) Feed Dealers	2	5	11	27
(d) Veterinarian	11	7	10	57
(e) Extension office	15	11	6	73
(f) Farm magazines	13	16	7	78
(g) Other[a]	-	1	-	2
Person contacted concerning beef herd problem:				
(a) Neighbor-cattle farmer	8	11	12	58
(b) Extension office	13	12	10	73
(c) Veterinarian	23	16	3	104
(d) University	1	2	4	11
(e) Feed dealer	-	2	8	12
(f) Relative	1	2	2	9
(g) Other[b]	-	1	4	-

[a]Other persons in the case included: Soil Conservation Service.

[b]Other sources in this case included: bank, farm magazines, and books.

for this and the following question. Farm magazines were the first choice of 13 respondents, the second choice of 16 respondents, the third choice of seven respondents, and had a weighted score of 78. However, there was little difference between farm magazines and the extension office which had a weighted score of 73, was the first choice of 15 respondents compared to 13 for farm magazines, was the second choice of 11, and the third of six. The veterinarian was a distant third choice with a weighted score of 57 and was the first response of 11 farmers, the second of seven farmers, and the third of 10 farmers. Neighbors and friends had a weighted value of 33, feed dealers 27, and relatives 11.

Person or Agency Contacted About Problems

Each farmer ranked the three persons whom he would contact if he had a problem concerning his beef cattle herd. The veterinarian was the most frequent choice being the first response of 23 farmers, the second response of 16 farmers, the third choice of three, and had a weighted value of 104. A distant second, the extension office, had a weighted score of 73, was the first choice of 13 respondents, the second of 12, and the third of 10. A neighbor-cattle farmer was the third most popular response with a weighted score of 58. Other responses included in the questionnaire were the University, feed dealers, relatives, the banks, farm magazines, and books.

Discussion of Beef Cattle Farming

Each farmer was asked if he could remember the person or agency with whom he last discussed beef cattle farming. Table 6 contains the responses given for this question. All but one respondent remembered the last person with whom he last discussed beef cattle farming. Twenty-five of the 47 farmers had last discussed beef cattle farming with a neighboring cattle farmer. The next most frequently mentioned discussant was the extension office with 11 responses while relatives evoked four responses. The University and the veterinarian each were stated by three farmers.

ATTITUDES AND MOTIVATIONS

The technique of analysis used for this section was developed by Hobbs in consultation with a panel of psychologists and sociologists at Iowa State University in 1963.[9] The procedure divides 71 questions into four broad categories—risk aversion, economic motivation, scientific orientation, and independence.

[9]See: Daryl J. Hobbs, *Value and Attitudes Prediction of Different Farm Management Ability,* unpublished Ph.D. Thesis, Iowa State University, 1962, or Araji, *op. cit.*

Procedures

The farmers filled out this questionnaire without the aid of the interviewer after the other schedule had been completed. The same questionnaire was mailed to the 40 farmers included in a study of large dairy farms and responses were received from 17 of the farmers.[10] The interviewees were asked to respond to the questions in one of the following five ways: strongly agree, agree, undecided, disagree, and strongly disagree. To provide a quantitative means of evaluating the schedules each response received a numerical value in the following manner:

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
1	3	4	5	7

The questions concerning each broad category were averaged to obtain a numerical value for the schedule with respect to risk aversion, economic motivation, scientific orientation, and independence.

Regression Analysis

The weighted scores for each of the four categories for each farmer were used as dependent variables in a regression anlaysis for which farmer characteristics were the independent variables. These included acres operated, year started handling beef cattle, whether the father raised beef cattle, gross farm sales, per cent of total sales from beef cattle, non-farm income, spouse's income, years of education, and age. All of the characteristics were in actual values except for gross sales and whether the father raised cattle. Gross sales for each farmer were coded in the following manner: no sales equals 1; $1 to $4,999 equals 2; $5,000 to $9,999 equals 3; $10,000 to $14,999 equals 4; $15,000 to $24,999 equals 5; $25,000 to $34,999 equals 6; $35,000 to $44,999 equals 7; $45,000 to $54,999 equals 8; and $55,000 and over equals 9. A dummy variable coding of 1 was used for farmers whose fathers raised cattle while farmers whose fathers did not raise cattle had a coding of 0 for this variable.

Risk Aversion

The average risk aversion score for the 47 farmers was 3.74, ranged from 1.73 to 4.88, and had a standard deviation of 0.49538. The equation used for the regression analysis was:

[10]Don C. Sibold, *Large Dairy Operations in West Virginia — 1970,* unpublished M.S. thesis, West Virginia University, 1971.

$$R = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 \quad (1$$

where R equals the risk aversion score, X_1 equals acres operated, X_2 equals year started handling beef cattle, X_3 equals whether the father raised cattle, X_4 equals gross sales, X_5 equals per cent of total sales from beef cattle, X_6 equals non-farm income, X_7 equals spouse income, X_8 equals years of education, and X_9 equals age. The estimated regression coefficients were as follows with the standard errors of the regression coefficients enclosed in parentheses:

$$R = a + \underset{(0.00012)}{0.00018X_1} + \underset{(0.00914)}{0.01093X_2} + \underset{(0.21255)}{0.04858X_3} - \underset{(0.04776)}{0.00175X_4} + \underset{(0.00361)}{0.00382X_5}$$

$$+ \underset{(0.00002)}{0.00001X_6} - \underset{(0.00004)}{0.00003X_7} + \underset{(0.02979)}{0.06533X_8} - \underset{(0.00859)}{0.00508X_9} \quad (2)$$

The results indicated that years of education was the only farmer characteristic that had a statistically significant regression coefficient—at the 0.05 level.

The farmer characteristics with regression coefficients that had a computed t-value of less than one were deleted from the analysis with the new regression equation as follows:

$$R = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 \quad (3)$$

where R again is risk aversion score, X_1 is acres operated, X_2 is year started handling beef cattle, X_3 is per cent of total sales from beef cattle, and X_4 is years of education. Equation 4 contains the estimated regression coefficients along with the standard errors of the regression coefficients in parentheses.

$$R = a + \underset{(0.00008)}{0.00017X_1} + \underset{(0.00618)}{0.01312X_2} + \underset{(0.00329)}{0.00414X_3} + \underset{(0.02536)}{0.06968X_4} \quad (4)$$

This analysis showed a significant relationship, at the 0.05 level, for acres operated, year started handling beef cattle, and years of education. In other words, farmers who operated more acres, started farming more recently, and had obtained more years of education had a stronger preference for risk, *i.e.*, less aversion to risk.

Economic Motivation

The average economic motivation score was 3.69 for the 47 farmers and ranged from 2.43 to 4.41 with a standard deviation of 0.34369. The same variables as in equation 1 were again used for the initial estimation except that the economic motivation score was substituted for the risk aversion score as the dependent variable. The estimated regression coefficients are given in equation 5 along with the standard errors of the regression coefficients in parentheses.

$$E.M. = a + 0.00009X + 0.00440X - 0.28400X + 0.02030X + 0.00262X$$
$$(0.00008) \quad (0.00553) \quad (0.14434) \quad (0.03243) \quad (0.00245) \quad (5)$$
$$- 0.00000X + 0.00000X + 0.02714X - 0.01133X$$
$$(0.00001) \quad (0.00002) \quad (0.02023) \quad (0.00584)$$

This estimated regression equation had no statistically significant coefficients at the 0.05 level of significance.

Each of the farmer characteristic coefficients that had a computed t-value between minus one and plus one were deleted from the regression equation so that the new equation was as follows:

$$E.M. = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 \quad (6)$$

where X_1 is acres operated, X_2 is whether the father raised cattle, X_3 is per cent of total sales from beef, X_4 equals years of education, and X_5 is age of farmers. Equation 7 contains the estimated regression coefficients along with the standard errors of the regression coefficients.

$$E.M. = a + 0.00013X_1 - 0.29860X_2 + 0.00249X_3 + 0.02253X_4 - 0.01433X_5 \quad (7)$$
$$(0.00006) \quad (0.13687) \quad (0.00228) \quad (0.01789) \quad (0.00449)$$

A statistically significant positive relation was found to exist between acres operated and economic motivation. In other words, farmers who operated larger farms were more economically motivated. A significant inverse relation existed between the economic motivation score and both the farmer's age and whether his father raised beef cattle. Thus the larger operators were more economically motivated, while the older ones were less so. It also appears that those who were raising cattle but whose father had not were more economically motivated.

Scientific Orientation

Scientific orientation had an average score of 3.87 for the 47 farmers interviewed and ranged from 2.54 to 4.68 with a standard deviation of 0.38238. Equation 1 was used for the regression by substituting the economic motivation score for the risk aversion score as the dependent variable. Equation 8 contains the estimated regression coefficients with the standard errors of the regression coefficients in parentheses.

$$S.O. = a + 0.00016X_1 + 0.00141X_2 - 0.06098X_3 + 0.00035X_4 - 0.00234X_5$$
$$(0.00009) \quad (0.00626) \quad (0.16343) \quad (0.03672) \quad (0.00277) \quad (8)$$
$$- 0.00001X_6 + 0.00002X_7 + 0.01238X_8 - 0.01422X_9$$
$$(0.00001) \quad (0.00003) \quad (0.02291) \quad (0.00661)$$

This analysis showed a significant inverse relation between scientific orientation and age of farmer, i.e., that younger farmers tended to be more scientifically oriented than older ones.

None of the farmer characteristics in the previous analysis approached significance except for acres operated and age of farmer. Therefore, all the other farmer characteristics were deleted from the original equation so that the new equation reads as follows:

$$S.O. = a + b_1 X_1 + b_2 X_2 \quad (9)$$

where X_1 equals acres operated and X_2 equals age of farmer. Equation 10 contains the estimated regression coefficients with the standard error of the regression coefficients in parentheses.

$$S.O. = a + \underset{(0.00006)}{0.00015X_1} - \underset{(0.00481)}{0.01649X_2} \quad (10)$$

This showed a statistically significant coefficient for acres operated at the 0.01 level of significance. The analysis also revealed a significant inverse relation for age of farmers and scientific orientation at the 0.01 level of significance. Therefore, younger farmers and farmers with larger farms tended to be more scientifically oriented than older farmers or farmers who operated smaller farms.

Independence

The average independence score was 3.73 for the 47 farmers, and ranged from 1.75 to 4.74 with a standard deviation of 0.40808. The independence score was substituted for the risk aversion score in equation 1 to analyze the factor affecting attitude. Equation 11 contains the estimated regression coefficients along with the standard errors of the regression coefficients in parentheses.

$$I = a + \underset{(0.00010)}{0.00006X_1} + \underset{(0.00735)}{0.00453X_2} - \underset{(0.19194)}{0.12383X_3} + \underset{(0.04313)}{0.04124X_4} + \underset{(0.00326)}{0.00220X_5} \quad (11)$$

$$+ \underset{(0.00002)}{0.00001X_6} + \underset{(0.00003)}{0.00002X_7} - \underset{(0.02690)}{0.01492X_8} - \underset{(0.00776)}{0.00704X_9}$$

These results revealed no significant relationships.

All the farmer characteristics except acres operated, gross farm sales, and age of farmers were deleted so the regression equation reads as follows:

$$I = a + b_1 X_1 + b_2 X_2 + b_3 X_3 \quad (12)$$

where X_1 is acres operated, X_2 is gross farm sales, and X_3 is age of farmers. Equation 13 contains the estimated regression coefficients along with the standard errors of the regression coefficients in parentheses.

$$I = a + 0.00007X_1 + 0.03274X_2 - 0.00982X_3 \quad (13)$$
$$\qquad\quad (0.00009) \qquad (0.03894) \qquad (0.00575)$$

Again, none of the farmer characteristics showed a statistically significant relationship with independence.

Comparison of Beef and Dairy Farmers

The attitudinal questionnaire was returned by 17 of the 40 large dairy farmers to whom it was mailed. In all cases, the average scores for the dairy farmers were larger than for the beef farmers (Table 7). This tends to indicate that beef farmers are less prone to take risks, less economically motivated, less scientifically oriented, and less independent (or more traditional).

An analysis of variance for the risk aversion, economic motivation, scientific orientation, and independence scores was made to test the statistical significance of the differences between dairy and beef cattle farmers (Table 8). The analysis showed that, at the 0.5 level, a statistically significant difference existed between dairy and beef cattle farmers with respect to risk aversion. The dairy farmers were more willing to accept risk and consequently had a higher risk aversion score. A significant difference also existed for independence with dairy farmers tending to be more independent in their farm management decision and consequently not necessarily following norms as much as beef cattle farmers appeared to do. However, the differences were not statistically significant (0.05 level) between the two groups with respect to scientific orientation or economic motivation although the latter was closer to significance than the former (the F ratio obtained would be that large through chance only 8 per cent of the time).

TABLE 7

AVERAGE VALUES OF WEIGHTED SCORES FOR ATTITUDINAL CHARACTERISTICS OF BEEF AND DAIRY FARMERS

Characteristic	Beef Farmers	Dairy Farmers
Risk Aversion	3.7359	4.0578
Economic Motivation	3.6922	3.8625
Scientific Orientation	3.8721	3.8815
Independence	3.7314	3.9555

TABLE 8

ANALYSIS OF VARIANCE FOR ATTITUDINAL DIFFERENCES OF BEEF AND DAIRY FARMERS

Source	Degrees of Freedom	Sum of Squares	Mean Square	F Value
		Risk Aversion		
Farmers	1	1.286	1.286	5.599
Error	61	14.014	0.230	
Corrected Total	62	15.301		
		Economic Motivation		
Farmers	1	0.364	0.364	3.102
Error	61	7.165	0.117	
Corrected Total	62	7.529		
		Scientific Orientation		
Farmers	1	0.001	0.001	0.009
Error	61	7.823	0.128	
Corrected Total	62	7.824		
		Independence		
Farmers	1	0.623	0.623	3.905
Error	61	9.739	0.160	
Corrected Total	62	10.362		

CONCLUSIONS

The linear programming results indicated that land use is an important influence on beef cattle production in West Virginia. Relatively large changes in the labor and capital coefficients and restrictions of the programming models did not result in beef cattle entering the computed optimal farm plans, but forcing full use of pasture did. Farmer responses tended to confirm that land adaptability was a major reason that they handle beef cattle. Farmers said that they have beef cattle because much of their land is adaptable only to pasture and that beef cattle are more suited to their type of farming.

Farmers' answers to the questionnaires also indicated that labor shortages might be a factor favoring beef cattle production instead of other enterprises that require more labor. For instance, labor shortage was the reason stated most frequently for not handling the farm's potential for beef cattle as well as being the major reason given by most farmers who were handling less or the same number of beef cattle as in the initial year of production. The linear programming solutions, however, indicated that a large surplus of labor exists, potentially, on the typical farm, except when labor supplies are severely restricted. This may result from inefficient methods of handling cattle in comparison to the enterprises used to obtain the standards or it may be due to the way the labor restrictions are set up in the model. For these, the total labor supply was in four broad periods and consequently total labor during a specific sub-period may be inadequate for planting, harvesting, feeding, etc. Alternatively labor may be substituted for capital on many farms, but in the absence of carefully conducted studies of labor efficiency those differing interpretations cannot be resolved.

Management factors also may enhance beef production in the State. Since there is no good way of measuring management ability, it was not incorporated in the linear programming models used for this or the earlier studies. Farmer opinions indicated that they think dairy farming requires considerably more skill and technical knowledge than beef cattle to be successful and in the absence of the requisite skills, training, and experience, beef appears to be preferred.

The linear programming plan which had beef cattle as its main livestock enterprise also results in the smallest net income of any of the plans analyzed. West Virginia farmers appear to be aware of this disadvantage since that was the most frequently listed disadvantage of raising beef cattle. Similarly, farmers indicated that they thought the cow-calf operation provided less returns per dollar invested than do sheep and dairy as the farm enterprises. The programming analysis showed that sheep would enter the solution when capital was limiting. The majority of farmers interviewed also believe that sheep provide the most income per dollar invested. However, a cow-calf operation in the farmers' opinions was second only to dairy in providing a steady income.

The plan which contained beef cattle was the only one that used all the available resources except labor. All others had some excess pasture or cropland. It was, in addition, the only plan that did not require large investments in capital goods other than replacement stock. It also was the only one that contained pasture improvement activities, a practice which is common on West Virginia farms. Since, however, there was excess pasture, in all the other plans there was no need to spend investment funds to improve them because that would only result in even a larger surplus.

The enjoyment derived from raising beef cattle appears to be a major factor encouraging beef cattle production since 37 of the 47 farmers stated that they would continue to raise beef cattle even if they could obtain the same income from another enterprise. It also was the second most frequently cited reason that individual farmers handle beef cattle.

The analysis of variance for beef and dairy farmers with respect to risk aversion, economic motivation, scientific orientation, and independence showed that the dairy farmers appear to be more willing to accept risk than the beef cattle farmers. The beef cattle farmers' responses also indicated that they thought that finishing fat cattle, poultry, hogs, and grain farming all exceeded dairy and beef cows in relation to the amount of risk involved. Among the beef producers the regression analysis showed that the larger, younger, and better educated were more risk oriented. Since the typical farmer tended to be older (54), had 12 years of education, but operated fairly large acreage, it can be inferred that beef cattle farmers tend to be conservative insofar as risk taking is concerned. The analysis of variance also indicated that dairy farmers tend to be more independent in their farm management decisions than do beef cattle farmers which indicates they are more willing to break away from neighborhood norms and try new methods.

It appears that West Virginia beef cattle farmers are aware that they might obtain more net income by adopting another livestock enterprise. However, this change in enterprise could result in additional risk, as well as requiring larger inputs of investment capital, larger purchases of variable inputs, nonuse or incomplete use of resources such as pastureland, or some combination of these. Therefore, many West Virginia farmers are willing to accept the lower net income to obtain the other advantages of raising beef cattle. Since beef-cow herds do seem to be the enterprise best adapted to use the resources the producer possesses, this result is consistent with the trends that have been observed in recent years.

IMPLICATIONS

The major implications of the results of this study seem to be that beef attle production will continue to be a strong enterprise in the State. Beef cow umbers can be expected to continue to increase or at least remain relatively table. The enterprise appears to more completely utilize the hilly, rolling, and nountainous pastureland of the State. Many farms have relatively small acreages f the cropland needed to provide feed for other livestock enterprises—unless the eed is purchased.

The analyses of the noneconomic factors tend to confirm that beef cattle vill continue to be a strongly competitive enterprise. Most producers indicated hat they like beef cattle and would continue to raise cattle even if other nterprises are as profitable. Furthermore, their response showed they were ware that beef cattle have low returns relative to many other enterprises. Thus, t appears that beef production will continue as long as such farmers earn what hey consider to be satisfactory income from beef cattle relative to what could e earned from other enterprises. Since the demand for beef has and probably vill continue to gain relative to that of other livestock the economic position of he beef enterprise should not become less competitive.

The results of this study were obtained from a sample of farmers who are ot typical of most West Virginia beef cattle producers. The farms were larger vith an average of 964 acres operated compared to an average 1969 farm size of 82 acres for six of the eight counties included in the study region (Grant, Greenbrier, Hardy, Pendleton, Pocahontas, and Randolph). The farmers were lso better educated (12.1 years compared to 8.7 years in 1964). While the esults cannot be transferred to other groups, the regression equation for risk aking, economic motivation, and scientific orientation did indicate that the etter educated farmers with larger acreages are more oriented toward these alues. To the extent that such an orientation should lead to adoption of the nterprises which are more profitable, but also more risky and requiring more kill, the farmers interviewed for this study could be expected to change more eadily than the more typical beef cattle producers, but the study showed elatively little tendency for such changes.

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